

SEQUENCE LISTING

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<120> Ricin Vaccine and Methods of Making and Using Thereof

<130> P67452US0 (RIID 01-58)

<140>

<141>

<160> 15

<170> PatentIn Ver. 2.1

<210> 1

<211> 576

<212> PRT

<213> Ricinus communis

<400> 1

Met Lys Pro Gly Gly Asn Thr Ile Val Ile Trp Met Tyr Ala Val Ala  
1                       5                       10                       15

Thr Trp Leu Cys Phe Gly Ser Thr Ser Gly Trp Ser Phe Thr Leu Glu  
20                       25                       30

Asp Asn Asn Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr  
35                       40                       45

Ala Gly Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg  
50                       55                       60

Gly Arg Leu Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu  
65                       70                       75                       80

Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu  
85                       90                       95

Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr  
100                       105                       110

Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe  
115                       120                       125

His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr  
130                       135                       140

Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg  
145                       150                       155                       160

Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn  
165                       170                       175

Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly  
180                       185                       190

Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln  
 195 200 205  
 Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg  
 210 215 220  
 Thr Arg Ile Arg Tyr Asn Arg Arg Ser Ala Pro Asp Pro Ser Val Ile  
 225 230 235 240  
 Thr Leu Glu Asn Ser Trp Gly Arg Leu Ser Thr Ala Ile Gln Glu Ser  
 245 250 255  
 Asn Gln Gly Ala Phe Ala Ser Pro Ile Gln Leu Gln Arg Arg Asn Gly  
 260 265 270  
 Ser Lys Phe Ser Val Tyr Asp Val Ser Ile Leu Ile Pro Ile Ile Ala  
 275 280 285  
 Leu Met Val Tyr Arg Cys Ala Pro Pro Pro Ser Ser Gln Phe Ser Leu  
 290 295 300  
 Leu Ile Arg Pro Val Val Pro Asn Phe Asn Ala Asp Val Cys Met Asp  
 305 310 315 320  
 Pro Glu Pro Ile Val Arg Ile Val Gly Arg Asn Gly Leu Cys Val Asp  
 325 330 335  
 Val Arg Asp Gly Arg Phe His Asn Gly Asn Ala Ile Gln Leu Trp Pro  
 340 345 350  
 Cys Lys Ser Asn Thr Asp Ala Asn Gln Leu Trp Thr Leu Lys Arg Asp  
 355 360 365  
 Asn Thr Ile Arg Ser Asn Gly Lys Cys Leu Thr Thr Tyr Gly Tyr Ser  
 370 375 380  
 Pro Gly Val Tyr Val Met Ile Tyr Asp Cys Asn Thr Ala Ala Thr Asp  
 385 390 395 400  
 Ala Thr Arg Trp Gln Ile Trp Asp Asn Gly Thr Ile Ile Asn Pro Arg  
 405 410 415  
 Ser Ser Leu Val Leu Ala Ala Thr Ser Gly Asn Ser Gly Thr Thr Leu  
 420 425 430  
 Thr Val Gln Thr Asn Ile Tyr Ala Val Ser Gln Gly Trp Leu Pro Thr  
 435 440 445  
 Asn Asn Thr Gln Pro Phe Val Thr Thr Ile Val Gly Leu Tyr Gly Leu  
 450 455 460  
 Cys Leu Gln Ala Asn Ser Gly Gln Val Trp Ile Glu Asp Cys Ser Ser  
 465 470 475 480  
 Glu Lys Ala Glu Gln Gln Trp Ala Leu Tyr Ala Asp Gly Ser Ile Arg  
 485 490 495  
 Pro Gln Gln Asn Arg Asp Asn Cys Leu Thr Ser Asp Ser Asn Ile Arg  
 500 505 510  
 Glu Thr Val Val Lys Ile Leu Ser Cys Gly Pro Ala Ser Ser Gly Gln

515

520

525

Arg Trp Met Phe Lys Asn Asp Gly Thr Ile Leu Asn Leu Tyr Ser Gly  
530 535 540  
Leu Val Leu Asp Val Arg Ala Ser Asp Pro Ser Leu Lys Gln Ile Ile  
545 550 555 560  
Leu Tyr Pro Leu His Gly Asp Pro Asn Gln Ile Trp Leu Pro Leu Phe  
565 570 575

<210> 2  
<211> 179  
<212> PRT  
<213> Ricinus communis

<400> 2  
Met Lys Pro Gly Gly Asn Thr Ile Val Ile Trp Met Tyr Ala Val Ala  
1 5 10 15  
Thr Trp Leu Cys Phe Gly Ser Thr Ser Gly Trp Ser Phe Thr Leu Glu  
20 25 30  
Asp Asn Asn Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr  
35 40 45  
Ala Gly Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg  
50 55 60  
Gly Arg Leu Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu  
65 70 75 80  
Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu  
85 90 95  
Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr  
100 105 110  
Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe  
115 120 125  
His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr  
130 135 140  
Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg  
145 150 155 160  
Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn  
165 170 175  
Gly Pro Leu

<210> 3  
<211> 198  
<212> PRT

<213> Ricinus communis

<400> 3

Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala  
1 5 10 15

Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu  
20 25 30

Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu Pro Asn Arg  
35 40 45

Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu Leu Ser Asn  
50 55 60

His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr Asn Ala Tyr  
65 70 75 80

Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe His Pro Asp  
85 90 95

Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr Asp Val Gln  
100 105 110

Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg Leu Glu Gln  
115 120 125

Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn Gly Pro Leu  
130 135 140

Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Ser Thr Gly Gly Thr Gln  
145 150 155 160

Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln Met Ile Ser  
165 170 175

Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg Thr Arg Ile  
180 185 190

Arg Tyr Asn Arg Arg Ser  
195

<210> 4

<211> 188

<212> PRT

<213> Ricinus communis

<400> 4

Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala  
1 5 10 15

Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu  
20 25 30

Thr Val Leu Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile  
35 40 45

Leu Val Glu Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu  
50 55 60

Asp Val Thr Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala  
65 70 75 80

Tyr Phe Phe His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His  
85 90 95

Leu Phe Thr Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn  
100 105 110

Tyr Asp Arg Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu  
115 120 125

Leu Gly Asn Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr  
130 135 140

Ser Thr Gly Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile  
145 150 155 160

Cys Ile Gln Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly  
165 170 175

Glu Met Arg Thr Arg Ile Arg Tyr Asn Arg Arg Ser  
180 185

<210> 5

<211> 199

<212> PRT

<213> Ricinus communis

<400> 5

Met Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly  
1 5 10 15

Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg  
20 25 30

Leu Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu Pro Asn  
35 40 45

Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu Leu Ser  
50 55 60

Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr Asn Ala  
65 70 75 80

Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe His Pro  
85 90 95

Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr Asp Val  
100 105 110

Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg Leu Glu  
115 120 125

Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn Gly Pro  
130 135 140

Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Ser Thr Gly Gly Thr  
145 150 155 160

Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln Met Ile  
165 170 175

Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg Thr Arg  
180 185 190

Ile Arg Tyr Asn Arg Arg Ser  
195

<210> 6

<211> 189

<212> PRT

<213> Ricinus communis

<400> 6

Met Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly  
1 5 10 15

Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg  
20 25 30

Leu Thr Val Leu Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe  
35 40 45

Ile Leu Val Glu Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala  
50 55 60

Leu Asp Val Thr Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser  
65 70 75 80

Ala Tyr Phe Phe His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr  
85 90 95

His Leu Phe Thr Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly  
100 105 110

Asn Tyr Asp Arg Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile  
115 120 125

Glu Leu Gly Asn Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr  
130 135 140

Tyr Ser Thr Gly Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile  
145 150 155 160

Ile Cys Ile Gln Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu  
165 170 175

Gly Glu Met Arg Thr Arg Ile Arg Tyr Asn Arg Arg Ser  
180 185

<210> 7

<211> 198

<212> PRT

<213> Ricinus communis

<400> 7

Met Val Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala

1	5	10	15
Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu			
20	25	30	
Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu Pro Asn Arg			
35	40	45	
Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu Leu Ser Asn			
50	55	60	
His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr Asn Ala Tyr			
65	70	75	80
Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe His Pro Asp			
85	90	95	
Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr Asp Val Gln			
100	105	110	
Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg Leu Glu Gln			
115	120	125	
Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn Gly Pro Leu			
130	135	140	
Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly Gly Thr Gln			
145	150	155	160
Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln Met Ile Ser			
165	170	175	
Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg Thr Arg Ile			
180	185	190	
Arg Tyr Asn Arg Arg Ser			
195			

<210> 8  
 <211> 188  
 <212> PRT  
 <213> Ricinus communis

<400> 8			
Met Val Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala			
1	5	10	15
Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu			
20	25	30	
Thr Val Leu Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile			
35	40	45	
Leu Val Glu Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu			
50	55	60	
Asp Val Thr Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala			
65	70	75	80
Tyr Phe Phe His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His			

85

90

95

Leu Phe Thr Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn  
 100 105 110

Tyr Asp Arg Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu  
 115 120 125

Leu Gly Asn Gly Pro Leu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr  
 130 135 140

Ser Thr Gly Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile  
 145 150 155 160

Cys Ile Gln Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly  
 165 170 175

Glu Met Arg Thr Arg Ile Arg Tyr Asn Arg Arg Ser  
 180 185

&lt;210&gt; 9

&lt;211&gt; 185

&lt;212&gt; PRT

&lt;213&gt; Ricinus communis

&lt;400&gt; 9

Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala  
 1 5 10 15

Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu  
 20 25 30

Thr Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu  
 35 40 45

Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr  
 50 55 60

Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe  
 65 70 75 80

His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr  
 85 90 95

Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg  
 100 105 110

Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn  
 115 120 125

Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly  
 130 135 140

Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln  
 145 150 155 160

Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg  
 165 170 175

Thr Arg Ile Arg Tyr Asn Arg Arg Ser

<210> 10  
 <211> 200  
 <212> PRT  
 <213> Ricinus communis

<400> 10  
 Met Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly  
 1 5 10 15  
 Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg  
 20 25 30  
 Leu Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu Pro Asn  
 35 40 45  
 Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu Leu Ser  
 50 55 60  
 Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr Asn Ala  
 65 70 75 80  
 Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe His Pro  
 85 90 95  
 Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr Asp Val  
 100 105 110  
 Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg Leu Glu  
 115 120 125  
 Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn Gly Pro  
 130 135 140  
 Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Ser Thr Gly Gly Thr  
 145 150 155 160  
 Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln Met Ile  
 165 170 175  
 Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg Thr Arg  
 180 185 190  
 Ile Arg Tyr Asn Arg Arg Ser Ala  
 195 200

<210> 11  
 <211> 190  
 <212> PRT  
 <213> Ricinus communis

<400> 11  
 Met Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly  
 1 5 10 15  
 Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg  
 20 25 30

Leu Thr Val Leu Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe  
35 40 45

Ile Leu Val Glu Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala  
50 55 60

Leu Asp Val Thr Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser  
65 70 75 80

Ala Tyr Phe Phe His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr  
85 90 95

His Leu Phe Thr Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly  
100 105 110

Asn Tyr Asp Arg Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile  
115 120 125

Glu Leu Gly Asn Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr  
130 135 140

Tyr Ser Thr Gly Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile  
145 150 155 160

Ile Cys Ile Gln Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu  
165 170 175

Gly Glu Met Arg Thr Arg Ile Arg Tyr Asn Arg Arg Ser Ala  
180 185 190

<210> 12

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: RTA198 primer  
for Nde I site.

<400> 12

gaattccata tgatttccc aaagc

25

<210> 13

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: RTA198 primer  
for stop codon and Sal I site.

<400> 13

gtcgacctag gatctacgg tgtatctaat tc

32

<210> 14

<211> 40

<212> DNA

<213> Artificial Sequence

<400> 14  
ctgtcagagg tagattgact gtcttgccctaaacagagttgg 40

<210> 15  
<211> 40  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Antisense PCR  
oligonucleotide sequence

<400> 15  
ccaaactctgt taggcaagac agtcaatcta cctctgacag 40